

Scatterometer in Studies of Tropical Cyclones in Past Two Decades

W. Timothy Liu and Hua Hu

Jet Propulsion Laboratory, California Institute of Technology

Spacebased scatterometers measure ocean surface wind vectors (speed and direction) under both clear and cloudy conditions, at spatial resolutions from 12 to 50 km. Since 1978, five scatterometers have been launched by the National Aeronautics and Space Administration and European Space Agency. Considerable efforts have been made to ascertain the accuracy of scatterometer wind retrieval under the strong wind and heavy rain conditions of tropical cyclones. Scatterometer data have been used in many research studies and operational applications because of the potential benefits.

In the past two decades, scatterometer winds have been used to monitor the evolutions of tropical cyclones. Scatterometer winds have been used to initialize numerical models and assimilated into them to predict the evolution of tropical cyclones; positive impacts have been found. Ocean surface pressure fields derived from scatterometer winds have been used to improve the estimate of location and intensity of the cyclones. Scatterometer winds have been used to study the extratropical transition of typhoon, the interplay between dynamic and hydrologic parameters in a hurricane, the oceanic responses to wind forcing of a tropical cyclone. Scatterometer winds show closed circulation ahead of the identification of Atlantic tropical depressions by the National Hurricane Center. Scatterometer winds have been used recently to study vortexes coming out of Africa and their selective evolution into Atlantic hurricanes. The history of the application of the scatterometer winds in the study of tropical cyclones will be reviewed.

